A Baetech Publication

May 1988

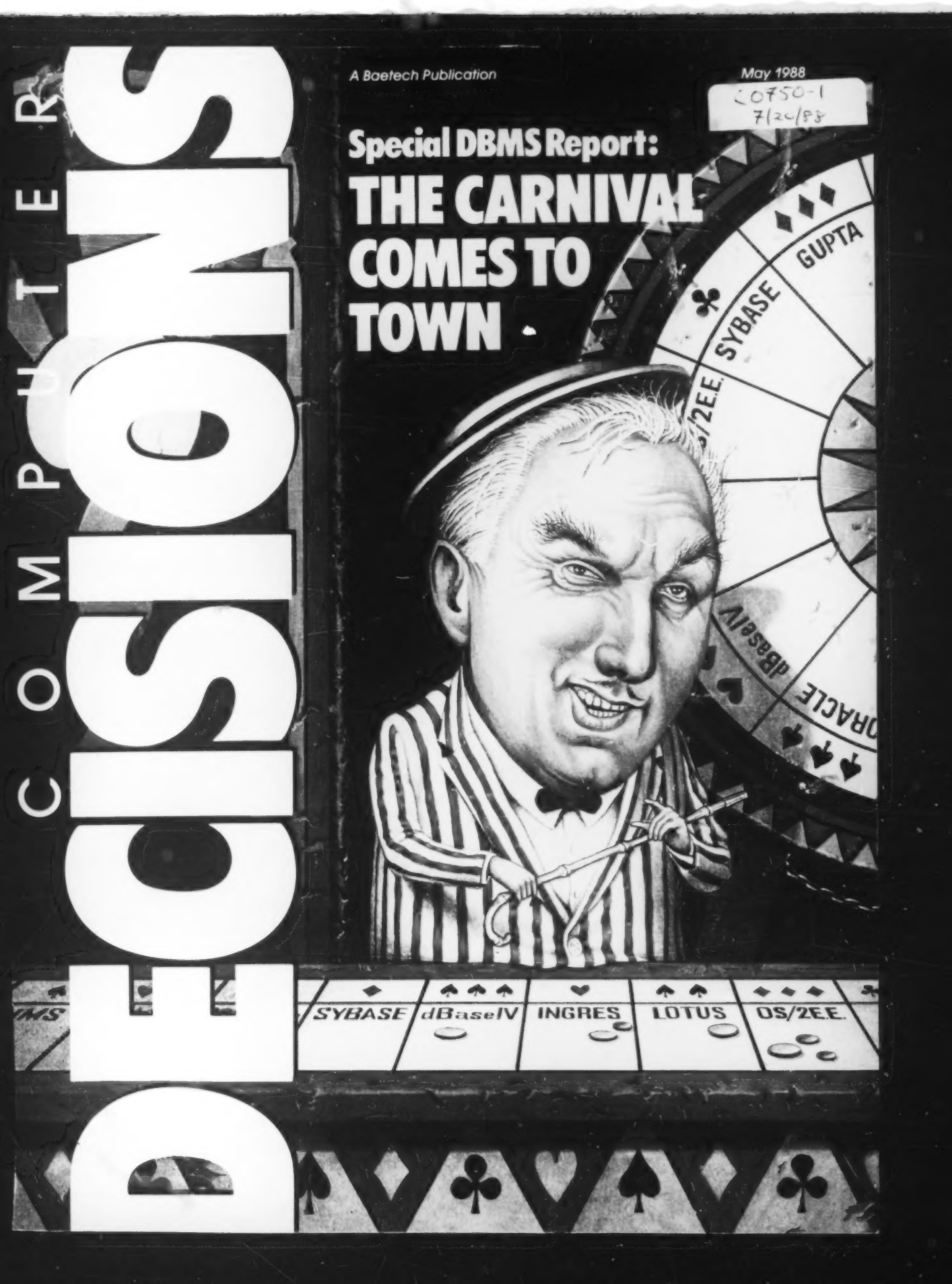
C0750-1
7/20/88

COMPUTER

DECISIONS

Special DBMS Report:

THE CARNIVAL COMES TO TOWN



COMPUTER
DECISIONS
Vol. 20 No. 5 May 1988

SPECIAL REPORT

STEP RIGHT UP . . . 32
. . . but make sure your valuables are secure. The new DBMS carnival offers plenty of opportunities—and pitfalls.
by Colin J. White

MICRO SOLUTIONS: FROM MIDWAY TO MAIN EVENT 35
Developments in the micro arena are moving the excitement in database management outside the mainframe big top.
by Lee Keough

REMOTE REFLECTIONS: DATABASES RESHAPE MIS 38
Dispersed databases will alter corporate information systems. Can MIS find a way to control its own destiny?
by John Soat

FEATURES

INTRODUCING OUR EDITORIAL ADVISORY BOARD 43

BRING ON THE ALTERNATIVES: THE DECISIONS/PAINE WEBBER SURVEY 47
Our latest survey reveals that information managers are looking beyond computing mainstays for solutions.
by John Rymer

MIS IN TRANSITION, PART III: DETROIT'S COUNTERATTACK STRATEGY 52
To fight back against imports, MIS departments in the auto industry share a common goal: Get cars to market faster.
by Paul Eisenstein

PERFORMANCE REPORT: SAS ADVANCES BY THE NUMBERS 58
The company known for its mainframe statistical analysis software is racking up impressive results despite a flat market.
by Miriam Lacob

OUT FROM UNDER SPAGHETTI NETWORKS 60
A tangle of multidrop lines can become an unbearable burden of inefficiency for telecomm managers.
by James B. Pruitt

FRONTMATTER

Your Turn 6
DECISIONS Intelligence 9

PERSPECTIVES

Information Interface 12
The allure of profits
Information Strategies 14
A view that makes sense
IBM World 16
IBM's shuffle: Calling all 'Ks'
Corporate Micros 17
Groupware takes shape
Database Decisions 20
Micro DBMS servers: wait

TECHNOLOGY TRENDS

Manufacturing 20A
Enter graphics 'supers'
Software 21
IBM and Unix: a puzzle
Microsystems 23
A platform to build on
Connectivity 26
Spans bridge network gaps
Networks & Communications . 28
T-1 nets: watch the clock
Systems & Peripherals 30
VAX 8800: Just an opener

SOLUTIONS FILE

CASE at the controls 63
At Lockheed Aeronautical Systems, a CASE tool proved instrumental in merging two disparate software systems.
Fast fiche saves face 64
Total Systems Services was losing a do-or-die race to meet its clients' schedules—until it found help.

PRODUCTS

Buyers' Guide 65
Presentation graphics software
Product Spotlight 68
Iomega's Bernoulli Box II: son of the super floppy
New Products 69
Advertiser Index 76
Product Index 76

Computer DECISIONS (USPS 771-1040 ISSN 0010-4558) is published monthly for $65 per year by BAETECH Publishing Corp., Glenpointe Centre East, DeGraw Ave., Teaneck, NJ 07666. Second-class postage paid at Teaneck, NJ 07666 and additional mailing offices. POSTMASTER: Send address change to *Computer* DECISIONS, P.O. Box 1031, Southeastern, PA 19398. For subscription information, please call (215) 630-9323.

EDITOR'S MESSAGE

The Sideshow in Palm Springs

Anyone who thinks vendors aren't eager for a piece of the new corporate DBMS action should have attended one particular session at the software industry's recent Adapso conclave in Palm Springs, CA. The panelists here happened to be Larry Ellison and Ed Esber, CEOs, respectively, of Oracle and Ashton-Tate. The subject was supposed to be networks. What instantly developed was a first-class competitive catfight over the relative lack of merit of "one-size-fits-all data managers" (Oracle's DBMS as seen by Esber), and the "utter nonsense" (in Ellison's view) of trying to integrate dBase IV on micros as part of an enterprise system spanning databases on mainframes, minis, and workstations.

In addition to alienating an entire audience who showed up to hear something completely different, the two managed to target and detail specific areas of high risk in each other's offerings. A tape of the full session is available from Adapso; I recommend it to anyone considering either of these DBMS solutions.

DECISIONS has also illuminated the major risks of the new micro DBMSs in this issue's Special DBMS Report beginning on page 35. We feel that the highest risk of all for corporate information managers would be to withhold consideration of the new technologies, particularly those with potential for distributed databases, until "the confusion clears up."

The confusion is only going to clear up for the MIS executives and administrators who begin to assess right now how these services and methodologies will help their corporations compete in the years ahead. It means cutting through a lot of smoke blown by vendors who give MIS all kinds of lip service at the same time they are telling end users to throw off their chains and buy independently. "We have tended to treat MIS like hobbyists," Ellison confessed in a moment of passion at the Adapso session. "We give them all this stuff and tell them to connect it." Not to be outdone, Ashton-Tate's Esber suggested that the client/server methodology his company will market jointly with Microsoft and Sybase is "a win for MIS" over what he calls the "freedom fighters" in the user departments.

Both CEOs promised that their respective companies will go to all ends to improve service and support of micro- and LAN-based DBMS solutions—working, so the implication goes, hand in glove with information managers.

Do they really mean this? If I were you, I'd need to see some proof.

Robin Nelson

Cover Illustration:
Joseph Salina

A PLATFORM TO BUILD ON

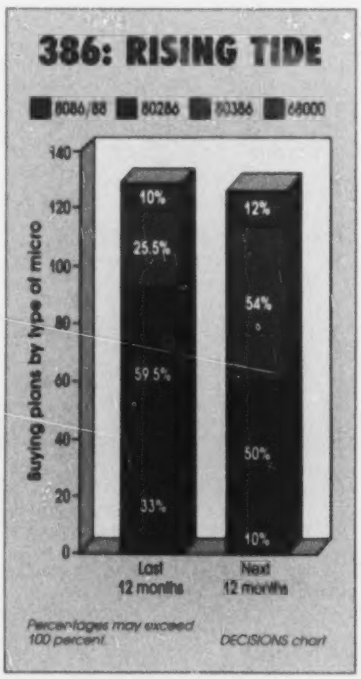
John Rymer

The march of microcomputer technology may finally be slowed by an internal force: the Intel 80386 microprocessor. Expectations of an 80486 chip notwithstanding, many MIS managers are settling on 386 micros as a technological plateau—a chance to catch up to recent rapid changes.

The numbers bear out the 386's growing popularity. Respondents to the latest DECISIONS/Paine Webber Survey of MIS Attitudes indicate they'll be buying more 386 micros during the next year—as many as 286-based machines (see chart). At a recent roundtable sponsored by DECISIONS, a group of micro managers from major corporations said they expected corporate buying of 386 micros to accelerate as prices for those machines fall during the next year or so. The prices of 386 micros like IBM's Personal System/2 Model 80, which ranges from about $7,000 to $13,000, discourage volume buying, they said. IBM is expected to cut PS/2 prices soon, although at press time it had yet to make any move to do so. The fact that hordes of vendors are selling 386 machines should make for lower prices.

Pure power is not the reason 386-based micros are likely to have a long and profitable run in corporate America, although it helps. Rather, MIS likes the 386 chip because it is ideal for multitasking under either MS-DOS or Operating System/2. Applications can be placed in their own slices of a 386 processor, or "virtual machines," and run virtually simultaneously, as if they were on separate micros. The 80286 chip can run applications in a virtual-machine mode, but it can't protect those modes from crashes. "Protected-mode multitasking is the key," says Ron Acher, manager of organizational analysis and systems at Con Edison, the New York-based power utility. "With OS/2 on a 286, I may be able to run nine pieces of software under Windows [from Microsoft Corp.], but if one crashes, I lock up the whole machine."

"With 20-20 hindsight, nobody would have designed the 286 chip," says Jerry Schneider, president of the Capital PC Users Group (Washington). "We would have started with the 386." With software like Redmond, WA-based Microsoft's Windows, applications in 386 protected mode can also be linked interactively. Acher notes that this allows MIS to tailor sets of applications to individual users, creating, in effect, integrated software packages.



Based on responses to the question "What kind of micros did/will you buy during the next 12 months?" on the fifth DECISIONS/Paine Webber Survey of MIS Attitudes.

Acher believes that within five years, corporations will have two IBM microcomputer standards: 386 micros running MS-DOS, and 386 micros running OS/2. Most 386 workstations, he predicts, will be standard bus machines, not micros based on IBM's Micro Channel bus. Schneider, however, believes OS/2 will be more widely used.

The 386 will spread in corporations in part because of the availability of inexpensive accelerator boards for existing IBM Personal Computers, Acher adds. The cost of a 386 upgrade, including additional memory and software, is about $2,000.

"Accelerator boards also allow you to stick with the PC-standard bus, delaying the move to IBM's Micro Channel," adds W.B. Browning, a Washington-based consultant and officer of the Capital PC Users Group. Interestingly, as prices for 386-based micros fall, Intel's 386 enhancement boards are getting much more expensive. In March, Intel raised prices on its Inboard 386/PC, which upgrades an IBM PC or PC XT, by 30 percent, to $995. The base model includes 1 Mbyte of memory. Inboard 386/AT costs $1,595 without additional memory, and $1,895 with 1 Mbyte of onboard memory.

One roundtable participant doesn't see the 386 as a technological plateau. Ted Klein, president of the Boston Systems Group and the Society for the Management of Professional Computing, urges MIS not to get too comfortable at any level of technology. "History is against the plateau theory," he says. "I remember people saying nobody would ever need more than the 286."

Nevertheless, Acher insists that users won't begin to take full advantage

of the 386 for some time to come. An appropriate historical analogy is the V-8 engine, he says. It was invented in the 1920s, perfected in the '30s, and remained the standard until the '70s. Klein doesn't believe the engine analogy holds up in the micro world. Standard interfaces to major operating systems will promote innovation and improvement, he says. When the 486 chip appears, the question won't be whether to move to it, but whether IBM will have its own version of the chip, parting company with the rest of the industry, Klein says.

SCSI: THE CHEVY OF INTERFACES

Embedded small computer systems interface (SCSI) controllers in storage subsystems offer users another peripheral interface option. SCSI usually costs a bit more, but the flexibility of the interface, if not its speed, may be worth the extra expense.

Manufacturers of disk drive controllers can use a single SCSI interface for a variety of devices, changing the bus adapter chips as needed to match selected hosts. SCSI interfaces offer price/performance competition for micro and workstation device-level interfaces like ST-506 and ST-412, the enhanced small device interface (ESDI), and the enhanced or high-level storage-module drive (ESMD). Improvements to SCSI are bringing it into competition with Intelligent Peripherals Interface (IPI) levels 2 and 3, which are featured on IBM 937X system peripherals (see chart).

SCSI puts more value in drives for users, says James Porter, president of Disk/Trend Inc., a consultancy in Mountain View, CA. SCSI chips embedded in drives take up less space than older interface boards and reduce cabling and maintenance costs, he says. Porter sees SCSI as playing a role in making the Apple Computer Inc. Macintosh more "office-acceptable." The addition of SCSI interfaces to the Apple Enhanced Macintosh series has permitted a wide range of office peripherals to provide Mac compatibility that wasn't possible on older Apple computers.

SCSI also eliminates costly adjustments to software drivers that must be made for interfaces like ST-412 to allow the host to switch to another peripheral of the same type with a different storage capacity, according to Joe Molina, president of Technology Forums, Chanhassen, MN-based coordinator of the SCSI Forum.

SCSI's storage buffering allows faster access between host and tape drives, keeping the drives streaming without interruption, notes Kim Kelly, product marketing manager of quarter-inch products and subsystems at Cipher Data Products in San Diego. Molina adds that SCSI's ability to disconnect from hosts and conduct transactions with peripherals cuts down on "command overhead"—the time it takes for a peripheral to receive a command and put it into action. Command overhead can take up valuable bus time, he says.

SCSI's Copy Command Set allows data to move directly from disk drives to tape in response to a "copy" command without involving the host. This saves host time formerly wasted on backup functions. The Copy Command Set has been adopted as a standard by the American National Standards Institute and is a subset of the proposed ANSI SCSI II standard.

Pick.

ADOBE POSTSCRIPT SOFTWARE

Choosing a laser printer?

Easy.

Pick one equipped with Adobe™ PostScript® software. PostScript is a page description language that comes as resident software in leading laser printers. And it's the first and only standard adopted by virtually every major company in the computer industry.

Which means printers equipped with PostScript software work with any computers you now have. Or plan to get. Including IBM® PCs, Macintoshs,® minicomputers, and mainframes.

So you get complete vendor independence. And total flexibility.

Let's say you have a report, proposal or newsletter that needs printing. Just use any printer in the office that is equipped with PostScript software. From low to high resolution. Even color. It's your choice.

And only printers equipped with PostScript software can handle the most powerful electronic publishing and graphics software tools in the business.

Like the Adobe Type Library. With hundreds of typefaces to expand your range of communication.

Adobe Illustrator™ software. A program that lets anyone draw like a pro. From the simplest to the most complex art.

And Display PostScript™—system software that brings the power of PostScript to any PC or workstation display.

For details on any Adobe product, call 800-29-ADOBE. In Alaska and Canada, call (415) 962-2100.

And see how being picky actually increases your choices.

ADOBE SYSTEMS INCORPORATED

PostScript is the registered trademark of Adobe Systems Incorporated. IBM is the registered trademark of International Business Machines. Macintosh is the registered trademark of Apple Computer, Inc. Adobe Illustrator, Display PostScript and Adobe are trademarks of Adobe Systems Incorporated. All products are registered trademarks and trademarks of their manufacturers.

BRING ON THE ALTERNATIVES

The fifth DECISIONS/Paine Webber Survey of MIS Attitudes shows information managers leaning toward LANs and Unix as major solutions.

by John Rymer

The latest DECISIONS/Paine Webber Survey of MIS Attitudes suggests a major shift in attitudes is under way. MIS managers are more seriously considering alternative computing platforms—like Unix and microcomputer-based local-area networks—than ever before.

Among respondents to the fifth of the quarterly surveys sponsored by DECISIONS and Wall Street securities brokerage Paine Webber Inc., 27 percent said Unix will be important to their information systems planning during the next 12 months. That's double the percentage of respondents who cited the importance of Unix on the third survey, conducted last September (see Figure 3).

By itself, this doubling is significant, and bodes well for the growing roster of vendors of Unix-based systems. But given the fifth survey's bias toward MIS managers in large corporations with IBM shops, the results can be interpreted as an even stronger vote for Unix. The 1,099 MIS managers who responded to the survey were drawn from a sample of 10,000 that intentionally excluded scientific, technical, and educational organizations, which otherwise would have skewed the results in Unix's favor.

If Unix is catching on in corporations, it's probably as a departmental supplement to operating systems already in use. This is a logical conclusion, given Unix's good track record in multiuser applications. It is also based on responses to a question about application development platforms. That question asked respondents to identify the development platform they use for the majority of applications now, and will use 12 months from now. Seven percent of respondents to that question indicated that Unix will dominate their application development in the coming year. Not surprisingly, IBM and Digital Equip-

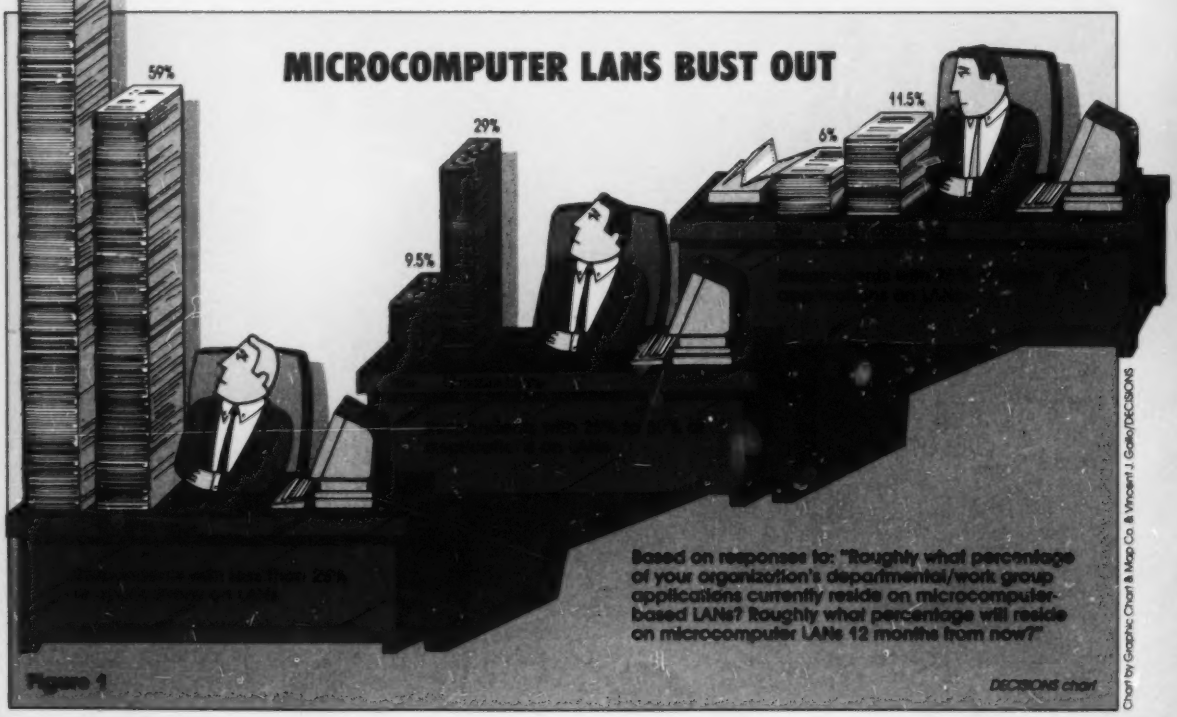

MICROCOMPUTER LANS BUST OUT
82%
59%
9.5%
29%
6%
11.5%
Based on responses to: "Roughly what percentage of your organization's departmental/work group applications currently reside on microcomputer-based LANs? Roughly what percentage will reside on microcomputer LANs 12 months from now?"
DECISIONS chart
Chart by Graphic Chart & Map Co. & Vincent J. Gallo/DECISIONS

Figure 1

ment Corp.—64.5 percent and 14 percent, respectively—will be the most widely used platforms in the coming year, according to respondents.

The responses indicate Unix has made a corporate breakthrough, says Paine Webber software analyst Robert Therrien. However, he adds, Unix vendors have much work to do. Above all, they must control expectations. "Unix lacks many features needed for transaction processing," Therrien says. "Nonetheless, the market is forcing Unix into these applications."

Micro-based LANs for departmental applications are also finding increased acceptance among MIS managers. In response to a question about departmental/workgroup applications residing on microcomputer-based LANs today and 12 months from now, the majority of respondents checked off "under 25 percent" in both cases. But the percentage of respondents planning to put more than 25 percent of departmental applications on LANs is triple the percentage reporting that level of LAN usage now. Also, as the accompanying chart indicates, the under-25 percent group shrinks over time, while those planning more LAN installations rises steadily. In part, this go-slow approach is undoubtedly due to the newness of the database technology necessary to support departmental applications (see the Special DBMS Report that begins on page 35).

The emergence of high-powered microcomputers and LANs as alternative platforms hasn't gone unnoticed on Wall Street, and one result has been tough trading sessions for the stocks of minicomputer vendors. Even DEC, a Wall Street favorite, has suffered. In fact, some analysts interpret DEC's recent reports of lower earnings and slower growth as a signal that the days of the minicomputer are numbered.

The fifth survey's results don't bear out such a conclusion, however. According to the several measures of corporate information systems planning included in the survey, minicomputer spending is strong and likely to remain so. Forty-six percent of respondents to a general question about the likelihood of spending increases and decreases in broad product categories said they expect to spend more

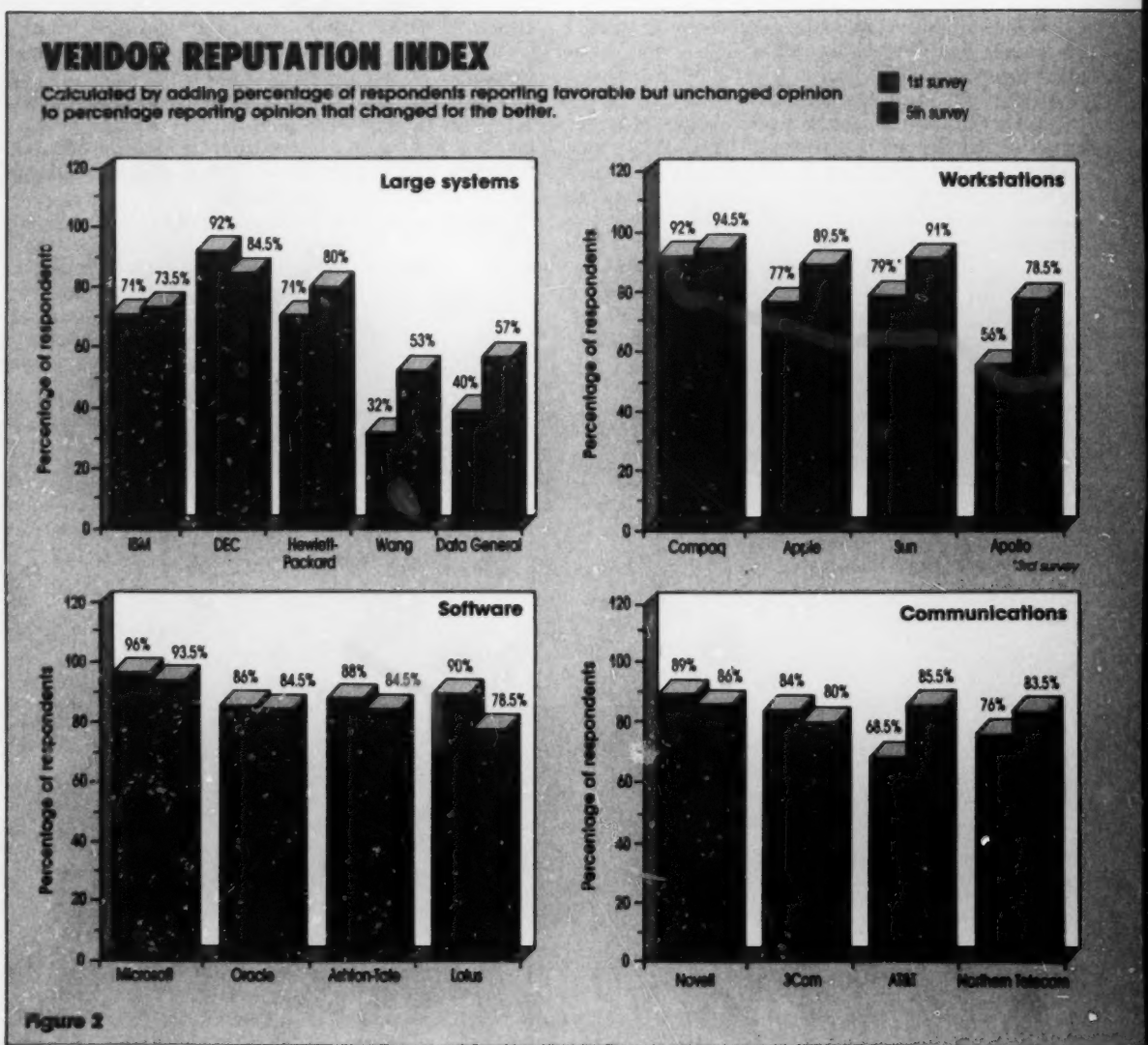


Figure 2

on minis during the next 12 months than the previous 12. Only 12 percent said their spending on minis will decline.

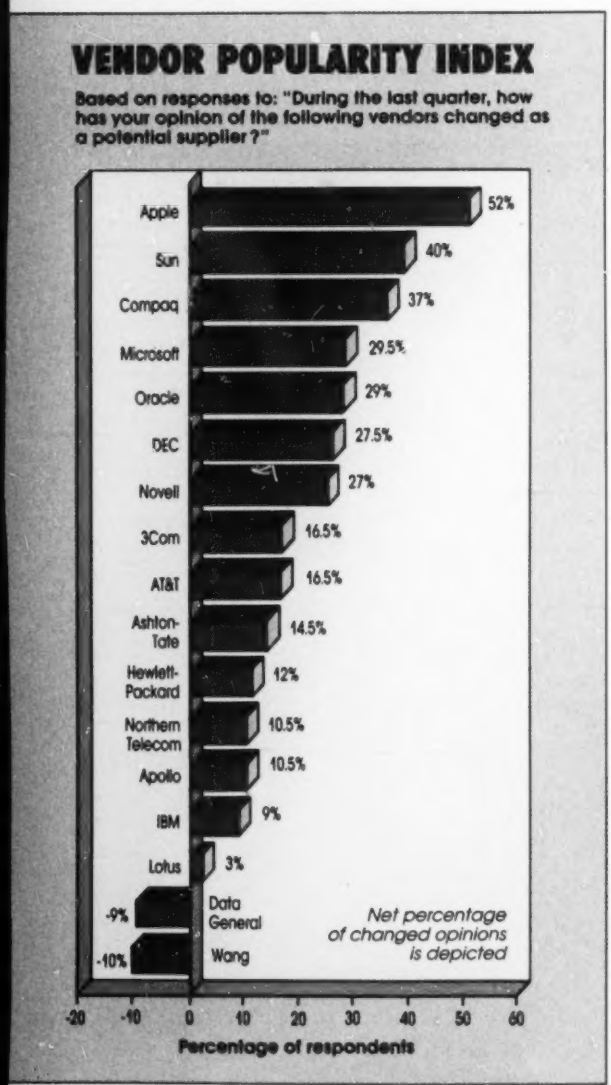
Among the mini vendors, DEC remains especially strong. Just short of half the respondents to a specific question about spending on DEC products said their spending will rise; only 8 percent said their DEC spending will decrease. On the fourth survey, taken three months earlier, 42 percent of respondents said they would increase their DEC spending, and 12.5 percent said they'd reduce it.

IBM, which has also been battered on Wall Street, can find plenty of good news in the fifth survey's measures of spending plans. First, mainframe spending in general is likely to increase, respondents say. In addition, a hefty 58 percent of the respondents to a question about spending on IBM products said they plan to spend more. That's 10 percent better than the response to the same question on the previous survey. At the same time, fewer respondents plan to reduce IBM spending—from 17.5 percent in the fourth survey to 12.5 percent in the fifth.

Another plus for IBM: Ten percent of respondents said they plan to buy IBM's slow-starting 937X midrange processor, up from 7 percent in the previous survey. Interestingly, these spending increases are indicated even though respondents report their total mainframe and minicomputer capacity during the year's first quarter dipped (see Figure 4).

IBM isn't without its problems, however. That's no surprise—on every one of our surveys, favorable results for IBM have been accompanied by some bad news. First, IBM has registered only slight improvement on the survey's Vendor Reputation Index, a broad measure of respondent attitudes toward individual vendors. In the year since we began compiling the index, which measures favorable short- and long-term opinion of vendors, IBM's ranking has improved by just 2.5 percent (see Figure 2).

Second, respondents display little interest in IBM's Micro Channel architecture. Micro Channel is vital to IBM's effort to set a new standard for corporate personal comput-



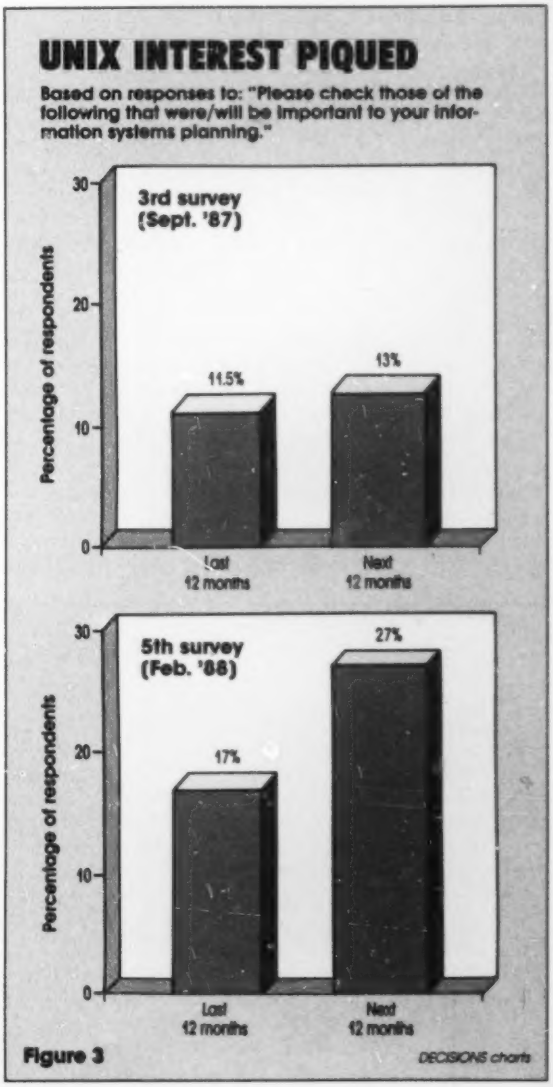


Figure 3 *DECISIONS charts*

ing with its Personal System/2 microcomputers. IBM has been marketing the architecture aggressively, saying buses based on it are faster and more functional than earlier alternatives, and are better able to take advantage of Operating System/2's multitasking features.

Survey respondents aren't anywhere near as sure about the importance of Micro Channel as they are about OS/2. About 12.5 percent of respondents to a question about information systems planning factors said Micro Channel will be important to their planning over the next 12 months. That's a percentage point less than the response to the same question on the previous survey—indicating interest is flat. However, 47 percent of the respondents to the planning question said OS/2 will be important to their planning for the next year. That's more than triple the number who said OS/2 is important to current planning (13 percent).

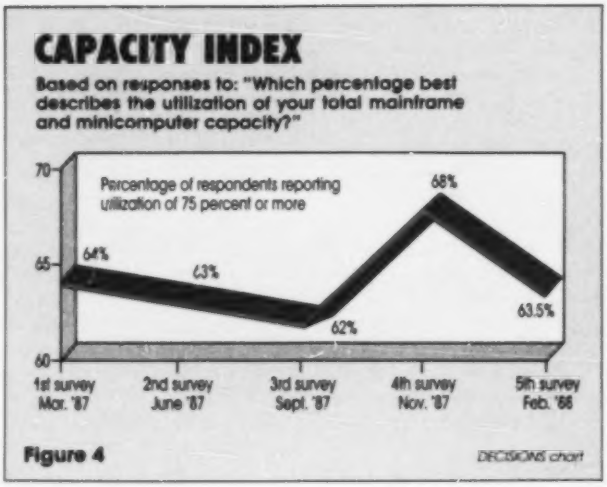


Figure 4

It's reasonable to conclude from these responses that IBM hasn't yet established a strong link between OS/2 and Micro Channel (read that, PS/2). The survey results indicate strong plans to purchase IBM's PS/2s. Fifty-five percent of respondents to a question about micro spending plans said they plan to buy PS/2s during the next 12 months, up from 43.5 percent on the previous survey. However, the results don't break out Micro Channel-based PS/2s and AT-bus models.

IBM's strength in micros is rivaled by Compaq Computer Corp. and other clone makers. One quarter of the respondents to this question said they will buy from Compaq this year; even more plan to buy from other micro makers. And looming on IBM's horizon is Apple Computer Inc., which got high marks from respondents to the fifth survey, improving on strong performances on earlier surveys.

Nevertheless, Apple has had a hard time translating its high ratings on our surveys into equally large leaps in purchasing plans. The fifth survey is no exception. Forty-three percent of respondents to the question about spending plans for specific vendors said their Apple spending will increase (up from 34.5 percent on the fourth survey). However, on the question asking which micro vendors respondents will buy from this year, 19 percent of respondents checked off Apple—only a percent more than said they already buy from Apple.

Apple's recent lawsuit against Microsoft Corp. and Hewlett-Packard Co., seeking to halt development of a Macintosh-like interface for OS/2-based systems, was filed after the fifth survey was conducted. Paine Webber's Therrien believes respondents to the next survey—the sixth in our series—may excoriate Apple for filing the suit.

The big surprise in the Vendor Popularity Index for the fifth survey: Lotus Development Corp. (Cambridge, MA) took a dive. Of respondents to the general opinion question, 13 percent said their opinion of Lotus had changed for the worse during the quarter, only 3 percent less than said their opinions had changed for the better. Paine Webber's Robert Therrien believes the responses indicate the split of opinion among MIS managers about Lotus. There's lots of pent-up demand for Lotus's soon-to-ship third version of its 1-2-3 spreadsheet software. However, new product delays have never endeared vendors to users, and Version 3 of 1-2-3 is late, Therrien notes. D

THE SURVEY: HOW AND WHO

The fifth DECISIONS/Paine Webber Survey of MIS Attitudes continues a series of quarterly surveys cosponsored by DECISIONS and Paine Webber Inc., the Wall Street brokerage house. The survey was conducted during the last week of February and the first two weeks of March 1988.

Questionnaires were mailed to 10,000 DECISIONS subscribers with MIS management titles. Excluded from the sample, however, were MIS managers in organizations whose primary business is marketing computer equipment and software.

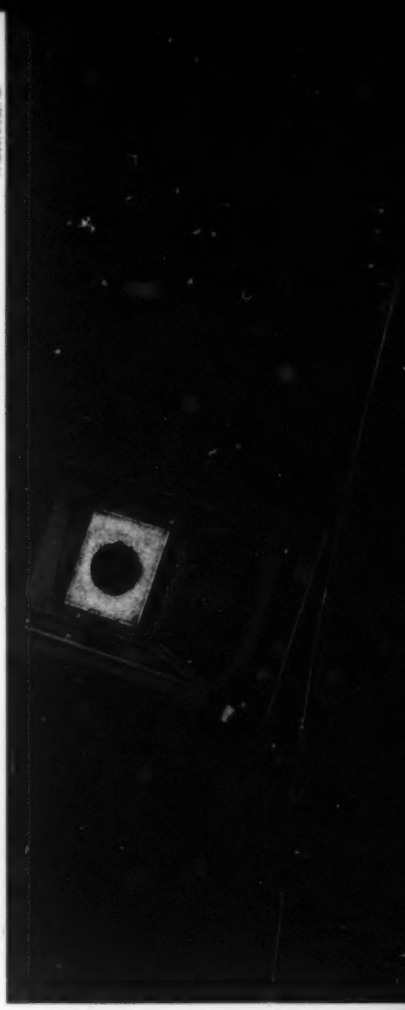
A total of 1,099 questionnaires were returned, a response rate just shy of 11 percent. SPSS Inc., a Chicago-based statistical software house that advises DECISIONS and Paine Webber on the survey, sets the survey's margin for error at 2.5 percent. SPSS tabulated results of the survey using its SPSS-X package for VM/CMS.

The survey's respondents represent MIS managers in large corporations. Of the respondents, 36.5 percent have IBM 3090 mainframes in their organizations. One quarter have IBM System/3X minicomputers. Thirty-five percent have DEC VAXs; 8 percent have IBM 937X midrange processors. Just under one-third of the respondents are responsible for or involved in the purchase of long-distance services. The largest group of respondents—30 percent—hails from manufacturing corporations. Government is the next largest group, at 17 percent, and insurance/financial services ranks third, at 12.5 percent.

DETROIT'S COUNTERATTACK STRATEGY

To fight back against imports, MIS departments in the auto industry share a common goal: Get cars to market faster.

by Paul Eisenstein


Andrzej Dudzinski

What is probably the most advanced example of computer-integrated manufacturing can be found in the Pontiac East assembly plant of General Motors Corp.'s Truck and Bus Group. It's no accident. The competitive squeeze exerted by Japanese and South Korean automakers has forced U.S. car manufacturers to face a stark reality: Automate or die.

Many U.S. manufacturers face a similar threat from foreign competitors, but the auto industry leads in the aggressive application of enterprisewide information systems solutions to that threat. The challenge: Get products to market faster. Meeting the challenge requires the concerted efforts of MIS pros cutting across organizational lines—from engineering to manufacturing to distribution. Systems at each stage of the process must be implemented with the next stage in mind if the challenge is to be met.

To that end, MIS is implementing and, most importantly, integrating a vast array of state-of-the-art automated systems. On the Pontiac East (MI) plant's 2.4-million-square-foot assembly line are 143 robots, many of them built into 25 assembly cells performing a variety of production operations for two- and four-wheel-drive vehicles. Robots from GMF Robotics Corp. are linked to Allen-Bradley Co. programmable controllers, which are linked to Hewlett-Packard Co. HP 9000 cell controllers, which are linked to Digital Equipment Corp. VAX area controllers, which are linked to IBM mainframes. All are integrated via Manufacturing Automation Protocol, a standard set of communications protocols based on the Open Systems Interconnection seven-layer model.

General Motors' investment in MAP—$2.6 billion to develop and implement MAP at the Pontiac East plant and four other factories—is one of the most significant aspects of the more than $40 billion it has pumped into factory automation and related information systems so far this decade. The automaker believes the money has been well spent. "It's unbelievable what the long-range savings can be," says Ernest O. Vahala, director of manufacturing engineering operations at GM Truck and Bus. The cost of computer communications systems can be reduced by 30 percent or more, he says, because they can all communicate via MAP devices rather than using proprietary equipment. More significantly, Vahala says, MAP allows factory engineers to use flexible automation systems that can quickly be reprogrammed to adapt to changes in vehicle or component design.

Such investments—and the changes they bring—are vital to the survival of the American auto industry. Since the late 1970s, U.S. automakers have been locked in a struggle for market share. Imports, especially those from Japan, have gobbled up roughly a third of the American new-car market.

Although the rising yen has been leveling off Japan's production cost advantage, that country's factories still are generally more efficient than those run by the Big Three—General Motors, Ford Motor Co., and Chrysler Corp.—often operating with half the manpower and far more automation. Manufacturers in South Korea, where labor costs are minuscule and exchange rates have remained relatively stable, enjoy an even greater cost advantage over domestic automakers.

GM is not alone in investing billions in response to competitive pressures. At least some of the credit for Chrysler's acclaimed turnaround must go to the $10 billion it invested in automation systems that have al-

lowed its older assembly lines and component plants to improve quality and productivity. Ford has invested about $20 billion over the last five years to upgrade its products and plants. The Big Three are also promoting—and in many cases demanding—the implementation of such systems by suppliers and dealers.

In its effort to come to grips with its growing reliance on automation and information systems, General Motors in 1984 reached for outside help. In a stunning move, GM spent more than $2 billion to acquire Dallas-based Electronic Data Systems. Thousands of GM computer and data processing employees were transferred to EDS, while EDS transferred several thousand of its employees from Texas to Detroit and began hiring thousands more from the Motor City area.

The transition was nowhere near as smooth or swift as expected, but the process is falling into place. EDS now serves as a central leader of a vast and previously not very well integrated computer network. It also serves as a linchpin in the overall effort—symbolized by MAP—to link all the components of GM's computer network, from executives' microcomputers to factory-floor systems.

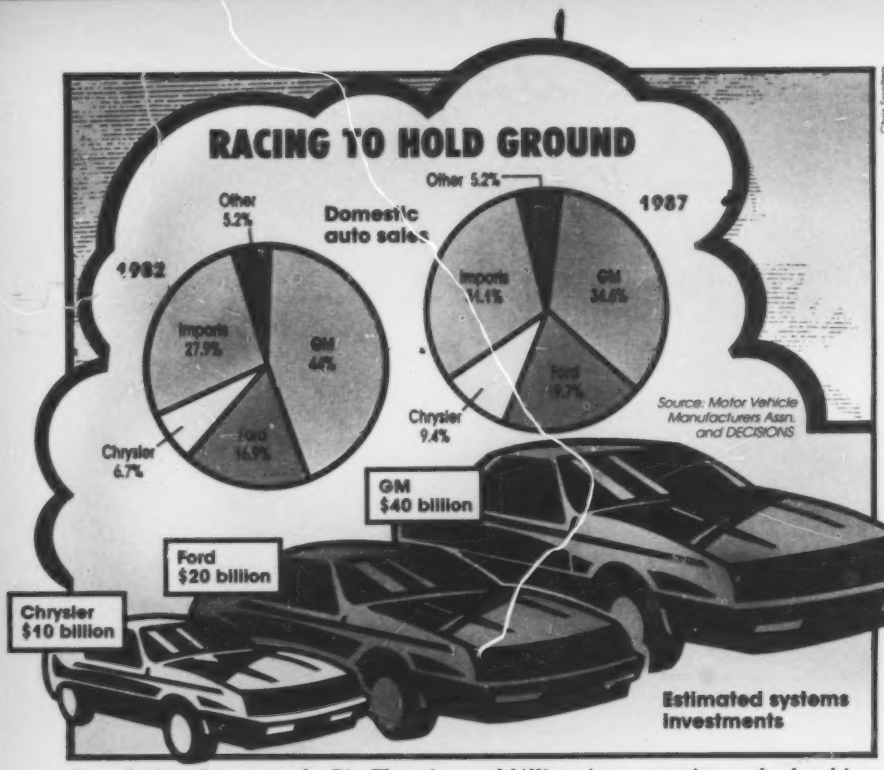
A similar need to update, integrate, and centralize information and automation systems is responsible for Ford's growing and as yet not fully defined relationship with IBM. So far, IBM has been providing hardware and advice on Ford's expanding use of automation. It is still unclear, however, just how far this relationship will go. Some of the work is being handled by IBM affiliates. One such affiliate, Measurex, is slowly adding a network of IBM 937X processors to help link the automaker's factory-floor and office systems.

Streamlining with MIS

Information systems and automation aren't the industry's only answer to today's competitive challenge; the automakers have also downsized their work forces to become more responsive and flexible to shifts in market demand. MIS is essential in making these new, leaner organizations function effectively—beginning with product design and development.

Cutting product development time is key to the success of U.S. automakers' automation efforts. Today, the typical lead time for a new American car model is five years. Japanese car manufacturers typically can design an entirely new vehicle and bring it to market in less than four years. Honda's lead time is down to 40 months, and its goal is three years.

"We are moving into an age of highly automated manufacturing," says Jerry Barnes, manager of engineering systems at Chrysler. "If products are going to be manufactured using these automated systems, they have to be designed that way. We can design a product using computer-aid-



Over the last five years, the Big Three invested billions in automation and related information systems to curb penetration of domestic markets by Japanese and other imports—and still lost ground. To maintain market share, those systems must now be honed to further cut the design-to-market cycle.

ed methods that will transfer intact to the manufacturing environment, allowing for what we estimate to be a 40 percent decrease in product development time. That will bring products onto the market in three years."

Such systems allow designers and engineers to modify designs quickly. "Our vision is to one day be able to do even initial sketches on the computer," says Chuck Jordan, vice president of General Motors' design staff. "We'll be able to take the sketch and evaluate it, define the surfaces, change the light source, rotate the vehicle." Jordan says GM has a contract with the Massachusetts Institute of Technology under which a system is being designed that will take digital information and produce a full-size hologram. "We call it 'The Studio of the Future,' and we've got one studio dedicated to it," he adds.

All of the Big Three are implementing, to some extent, systems incorporating design-for-manufacturing concepts—designing with manufacturing requirements in mind from the very start of the project. Designers can quickly estimate the cost of producing machined parts, speeding design time and lowering manufacturing costs. Ford credits these systems with reducing manufacturing labor costs by as much as 80 percent and material costs by as much as 40 percent.

While most of the automotive design and engineering work today is being done on micros and minicomputers, speeding up the design process is one of several reasons that the Big Three have invested in supercomputers. Supercomputers are used to simulate tests done in wind tunnels, speeding up the development of aerodynamic shapes; they also simulate crash tests.

Lemon control

Designing for manufacturing improves part quality as well, an integral aspect of speeding products to market. Several years ago, Chrysler developed its Performance Feedback (PFB) quality control system to check cars as they roll along the assembly line. PFB, which runs on an IBM 4381 processor, is in use in Chrysler plants in Sterling Heights, MI, Belvidere, IL, and St. Louis. "PFB ensures that when the car comes off the line, it's built correctly," says Nick Simonds, Chrysler's executive director of MIS. "If a worker detects a problem, like a scratch in the paint or a defective part, it can be punched into the computer, and someone down the line will check and correct it."

General Motors uses an in-house-developed computerized diagnostics system called Assembly Line Diagnostic Link (ALDL), which tests fully or partially assembled vehicles at various stations in the assembly plant. One GM official, who requested anonymity, estimates that before using ALDL, as many as 15 percent of the company's new cars were being shipped with problems ranging from missing hoses to defective engines or transmissions. Today, he says, that figure has dropped to around 2 percent. "No test is perfect," observes Rick Knoth, a GM engineering group manager instrumental in implementing ALDL, "but without ALDL, we'd have significantly more cars in customers' hands not operating correctly." As with its other automation systems, GM has designed ALDL to interface with MAP.

Ford and Chrysler also are keeping close watch on the development of MAP, but their commitment to the protocol is far less certain at this point. Since retooling its Windsor, Ontario, mini-van plant in 1981, Chrysler has worked toward a goal of interconnectivity, says Frank E. Plonka, a manager in Chrysler's Technical Systems Division for Advanced Manufacturing Operations. Chrysler has based much of its factory automation on Milwaukee-based Allen-Bradley's Data Highway, developing "a proprietary Factory Information System unique to our company," Plonka says. "We have a system of local-area networks from third-party suppliers tying together our programmable controllers," he explains. "We have written custom code to hook them all together." It took seven employees about a year to design the original system, he says. Each update has taken from six to nine months. "Chrysler does support

and will continue to support the MAP standard," Plonka adds, "but so far we have not made use of it in any of our facilities. We plan on converting to MAP when we feel it makes sense for us to do so."

Ford has begun implementing MAP in its factories; it has already converted to MAP at its Rawsonville components facility in suburban Detroit, and in its Dagenham, England, engine plant. "A lack of standards would mean that we would have a major hurdle to overcome in our search for efficiency of operation," says Jim Cnossen, manager of manufacturing systems and operations research. He points out that Ford is represented on the national MAP steering committee, and has an internal committee set up to stay abreast of developments. "We have planners working on MAP implementations, and we continue to support MAP efforts," Cnossen says. "As we install new equipment in our facilities, we are continuing to position ourselves into MAP."

Essential connectivity

Whether or not MAP ultimately becomes the dominant industrywide standard, interconnectivity is essential at a variety of levels, these managers agree. And that's not limited to confines of the factory, as suppliers to the Big Three begin to take on a larger role in participating in part design and engineering. Ford, for example, has essentially turned over all door latch design and manufacturing to a Canadian manufacturer, Magna International. Electronic data interchange, the computer-to-computer exchange of documents like purchase orders and shipping notices, expedites the process.

By the early 1990s, industry analysts predict, virtually all of Detroit's auto assembly plants will be receiving their inventory on an as-needed basis. According to a study by the Auto Industry Action Group, a Southfield, MI, trade association, only 10 percent of those suppliers surveyed in 1981 said they received most of their material releases from the Big Three electronically. In the most recent AIAG survey, conducted two years ago, that had grown to 54 percent, and the figure is now believed to be substantially higher.

The Big Three are also adopting just-in-time manufacturing techniques, in which parts may be delivered to a factory sometimes minutes before assembly. JIT reduces labor, inventory, and other warehousing costs, and can lead to improved quality control. A philosophy rather than an automation system, JIT methods are being incorporated into many manufacturing planning and scheduling systems. JIT requires that an automaker keep tight control of its production schedule and that such details be accurately transmitted to its suppliers, which in turn must ship the right number of components needed at the factory at any given time.

For example, every day Chrysler assembly lines turn an assortment of 38 million parts into nearly 9,000 cars and trucks. Until recently, the typical Chrysler plant had several months' worth of components in its warehouse. In 1981, the typical Chrysler assembly line turned over its inventory no more than 16 times a year. Today, the average is 54 turnovers annually—more than once a week. And the goal is once every five days, says Richard E. Dauch, Chrysler's executive vice president of manufacturing.

The primary factor behind that improvement is the JIT system introduced at Chrysler's refurbished Windsor plant in late 1983. The system lets the automaker closely track its production plans and then precisely order components from its 2,300 material suppliers. "We very carefully communicate our requirements to suppliers and give them a very disciplined schedule that does not

DETROIT MIS: BEYOND HIGH TECH

You might expect the office of the executive director of MIS for Chrysler Corp. to be a high-tech wonderland—after all, last year Chrysler spent about a quarter of a billion dollars on information systems. But if Nick Simonds decides to go online, he has to log on from someone else's office. Right now, he says, managing people is a far more important part of his job than managing technology.

Courtesy Chrysler Motors

A consistent direction is as key to MIS success as any technology, says Chrysler's Nick Simonds.

"If all I had to do was work with technology, I'd only work half a day," says Simonds. "There's not one problem I don't have a technical solution for. It's getting agreement on direction and consistency that's important. Most information systems cross organizational boundaries, so you get caught up with each group wanting to do things its own way."

Managing technology will always be part of the job, however. Major advances in automation systems are imminent for the auto industry, Simonds says, citing machine vision as one example. But, he adds, Chrysler and its competitors have yet to make the best use of the technology already available to them. "It's not purely a matter of technology," he explains. "It's how we apply it. Get consistency in direction, keep it up, and then get your best people in there."

Simonds joined Chrysler in 1984 after working for National Intergroup in Pittsburgh and Inland Steel in Chicago. He directs the planning, development, and implementation of information systems comprising three computer centers with about 1,000 employees and more than 30,000 microcomputers and terminals.

Simonds begins his typical work day before 7:30 a.m. He is an avid squash player, and several days a week he can be found working up a sweat during lunch hour at a court in the recreation area of Chrysler's K.T. Keller management building. He lives in Grosse Pointe, MI, with his wife, Nanne. Their son and daughter are college students. In his leisure time, Simonds enjoys skiing, reading, and Saturday morning platform tennis. "I'm really unprogrammed outside of work," he says.

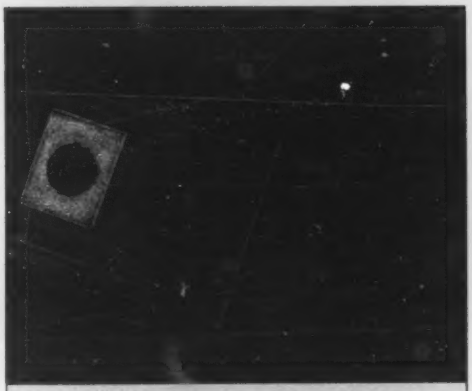
change," Dauch says. "Then they can predict what they need to deliver in terms of volume, mix, color, or option so accurately that we have had very few crises." Ford and GM have also adopted JIT, particularly in newer plants.

The role of information systems in the auto industry is not limited to design, engineering, and manufacturing. The Big Three are also implementing systems in their distribution networks. Ford recently created a new Marketing Systems and Communications Office to oversee the implementation of a far-reaching, five-year dealer services program that will be based on more than $2 billion worth of IBM hardware. Chrysler recently connected all of its 4,000 North American dealers through the Dealer Information Access Link (DIAL II) system; that network will soon be linked to the 2,000 additional dealers acquired by Chrysler when it took over American Motors Corp. last year. "We use IBM PC ATs linked to corporate mainframes to connect the dealers to place car and parts orders, check warranty claims and order status, and get service bulletins and electronic mail," Nick Simonds says.

According to Simonds, DIAL II was put in place to "to make it quick and easy for a dealer to do business with us. We're hoping to tie it into our financial subsidiary soon so that a salesperson can get loan approval right on the floor with the customer there," he adds. General Motors has taken a number of similar steps, and has even been using its remote satellite distribution system to improve ties to its more than 10,000 U.S. dealers.

U.S. automakers are also beginning to use what one GM engineer describes as "a mechanic in a box." Two years ago, Ford launched its Online Automotive Service Information System (OASIS), which assists dealer service technicians with the diagnosis and repair of difficult problems. OASIS now processes more than 10,000 calls daily. Similar systems are in development at Chrysler and GM.

Despite the wide variety of information systems in use throughout the auto industry, the rate of implementation is currently an issue of uncertainty. In some cases, technology has not been developed as quickly as anticipated. In other instances, budget cuts have forced nonessential applications to be delayed or scrapped altogether. Indeed, if the U.S. economy goes into a recession in the next year or two, as some predict it will, there could be some sizable cutbacks in automated and information systems spending in the auto industry.



'We went through automation for automation's sake. The key word now is simplicity.'

Thus far, the sharpest cutbacks have hit vision and robotics systems. According to Dataquest, a San Jose, CA, market researcher, the Big Three accounted for 54 percent of all robotics sales in the United States in 1986. This year, that share may fall below 44 percent. Much of the slowdown has been the result of budget cutbacks at General Motors. GM's capital spending totaled $10.6 billion in 1986. It dipped to about $7.9 billion last year, and will decline to $5.9 billion by 1989. Much of that reduction is the result of the delay or cancellation of high-tech systems.

By last fall, General Motors had installed 6,400 robots, and had another 1,100 on order. A few years ago, General Motors forecast it would have 10,000 robots on line by the end of this year. Now, that target won't be hit until the early 1990s.

The cutback in capital spending is not the only reason GM is scaling back its use of robotics, however. The company's forays into robotics haven't been resounding successes. For example, GM's Lake Orion plant in suburban Detroit, dubbed its "factory of the future," boasted 157 robots and a host of other automated devices when it first went into operation in 1984. Company officials proudly boasted that the plant would provide the best quality and productivity of any GM plant. Instead, the $650 million assembly line has turned into one of GM's biggest headaches, with productivity and quality among the automaker's lowest. At 3.7 million square feet, the factory is double the size of most auto plants, and with 6,700 workers, it has nearly triple the work force of the New United Motor Manufacturing Inc. assembly line, which GM runs jointly with Toyota. NUMMI produces roughly the same number of cars with less than half the automation.

"We went through a phase of automation for automation's sake," says William Hoglund, executive vice president in charge of the Buick-Oldsmobile-Cadillac "large car" group. "The key word now is simplicity. The automation has to be pretty straightforward."

Such lessons have not been lost on GM's competitors. "You will see a continuing trend in our company against putting massive amounts of money into hard automation, but rather to spend it on automation that keeps our facilities working at maximum capacity and efficiency," says Rex Greenslade, a Ford spokesman.

For the Big Three, times have irrevocably changed. When they competed only with one another, there was little impetus to make striking changes in manufacturing methods and systems. The globalization of the auto industry has changed the ground rules. To achieve the gains the automakers need to make in terms of productivity, quality, and profitability requires fundamental changes in the way they operate. A combination of management changes and integrated systems may be the only answer. ■

Paul Eisenstein is a free-lance writer based in Pleasant Ridge, MI.